

38. (amended) A freeze control system for a spa, wherein the spa is surrounded by ambient air having an ambient air temperature, said freeze control system comprising:

- A. a spa tub means for containing tub water having a tub water temperature,
- B. spa piping means for circulating water to and from said spa tub,
- C. a heating element means for producing heated water,
- D. at least one air blower means for blowing air into said spa tub,
- E. at least one water pump means for pumping the heated water,
- F. a first sensor means for detecting said tub water temperature,
- G. a second sensor means for detecting said ambient air temperature, and
- H. a computer means programmed to process signals generated by said first sensor means and said second sensor means, wherein said computer means automatically selectively activates and deactivates said at least one air blower means and said at least one water pump means based upon inputs from said second sensor means so that the temperature of the water inside said spa tub means and said spa piping means is maintained above the freezing level.

REMARKS

Informalities Noted in the Claims

Examiner has noted informalities in Claims 26, 32 and 38. In response, Applicant has corrected the informalities.

Claim Objections

Examiner has objected to Claim 38 under 37 CFR 1.75(b) as being a duplicate of Claim 32. In response Applicant has amended Claim 38 so that it is not a duplicate of Claim 32.

Claim Rejections

35 USC 112

Examiner has rejected Claim 37 under 35 USC 112, second paragraph. Specifically, Examiner has stated Claim 37 contains a term lacking proper antecedent basis. In response, Applicant has amended Claim 37 so that there is proper antecedent basis.

35 USC 103

Claim Rejections – 35 USC 103

Tompkins ivo Dundas

Examiner has rejected Claims 13 – 25 under 35 USC 103(a) as being unpatentable over Tomkins (5,559,720) in view of Dundas (4,189,791). Specifically, Examiner states,

Although Tompkins et al. use water temperature sensor 21 as well as other water sensors to operate the freeze control system, attention is directed to Dundas who discloses another freeze control system for a spa or pool that uses both a water temperature sensor and an ambient air temperature sensor to activate the control system in order to heat the pool using minimal energy with less waste and expense. It would have been obvious to one of ordinary skill in the spa/pool art, at the time the invention was made, to use an ambient air temperature sensor in conjunction with the water temperature sensor in the control system of Tompkins et al. in view of the teachings of Dundas in order to more effectively operate the control system using minimal energy and less waste and expense. (emphasis added).

Furthermore, Examiner states,

Both the Tompkins et al. and Dundas references relate to the common art of pools, tubs and spas all of which are containers for holding a body of water and, more specifically, to the common art of freeze control systems for contained bodies of water. Since Applicant is concerned with a freeze control system, it is considered that both Tompkins et al. and' Dundas references are pertinent to the particular problem, i.e., preventing the freezing of a body of water, with which Applicant is concerned. (emphasis added)

Applicant respectfully directs Examiner's attention to the only sentence in Dundas that discusses the utilization of Dundas' device for freeze control (column 4, lines 23 –26). Dundas states:

It may be desirable to manually operate the system even in subfreezing weather to blow air into water and circulate the water and draw the warmer water near the bottom upward to prevent ice from forming. (emphasis added)

Please note, that Dundas makes a specific point that to operate as a freeze control system, his device needs to be manually operated. This means that in Dundas, the utilization of

an ambient air sensor is not used when the system is being utilized for freeze control. Indeed, nowhere in Dundas is it contemplated that the utilization of an ambient air sensor for freeze control will be effective.

Except for when operating as a freeze control system, throughout Dundas the ambient air sensor is used to determine when there is a significant temperature differential between the warmer ambient air and the water. When temperature differential is reached Dundas' air pump automatically pumps the ambient air into the water to warm the water. Dundas must have known that in subfreezing weather the ambient air is at least as cold or probably colder than the temperature of the water in the pool. It follows, then, that his system (which requires the ambient air to be warmer) would not be effective to automatically control freezing in the pool. Therefore, this is why Dundas specifically stated that his system should be operated manually in subfreezing weather to "circulate the water and draw the warmer water near the bottom upward to prevent ice from forming".

Therefore, to further distinguish Applicant's invention from the prior art, Applicant has amended Independent Claim 26 so that it now contains the limitation:

whcrein said computer automatically selectively activates and deactivates said at least one water pump based upon inputs from said second sensor so that the temperature of the water inside said spa tub and said spa piping is maintained above the freezing level. (emphasis added)

Claims 32 and 38 are similarly limited.

Neither Thompkins, Dundas, nor any other reference cited by Examiner discloses an ambient air sensor used in conjunction with a computer for automatic freeze control. Had it been obvious, Dundas would have disclosed it rather than specifically go to the trouble of stating that it would be desirable to manually operate his system to prevent ice from forming.

CONCLUSION

Thus, for all the reasons given above, this application, as the claims are presently limited, define a novel, patentable, and truly valuable invention. Hence allowance of this application is respectfully submitted to be proper and is respectfully solicited.

Respectfully Submitted,


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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Changes Made to the Claims

Claim 26 was amended as follows:

26. (amended) A freeze control system for a spa, wherein the spa is surrounded by ambient air defining having an ambient air temperature, said freeze control system comprising:

- A. a spa tub containing tub water defining having a tub water temperature,
- B. spa piping for circulating water to and from said spa tub,
- C. a heating element for producing heated water,
- D. at least one water pump for pumping the heated water,
- E. a first sensor for detecting said tub water temperature,
- F. a second sensor for detecting said ambient air temperature, and
- G. a computer programmed to process signals generated by said first sensor and said second sensor, wherein said computer automatically selectively activates and deactivates ~~said heating element~~ and said at least one water pump based upon inputs from said second sensor so that the temperature of the water inside said spa tub and said spa piping is maintained above the freezing level.

Claim 32 was amended as follows:

32. (amended) A freeze control system for a spa, wherein the spa is surrounded by ambient air defining having an ambient air temperature, said freeze control system comprising:

- A. a spa tub containing tub water defining having a tub water temperature,
- B. spa piping for circulating water to and from said spa tub,
- C. a heating element for producing heated water,
- D. at least one air blower for blowing air into said spa tub,
- E. at least one water pump for pumping the heated water,
- F. a first sensor for detecting said tub water temperature,
- G. a second sensor for detecting said ambient air temperature, and
- H. a computer programmed to process signals generated by said first sensor and said second sensor, wherein said computer automatically selectively activates

and deactivates said heating element at least one air blower and said at least one water pump based upon inputs from said second sensor so that the temperature of the water inside said spa tub and said spa piping is maintained above the freezing level.

Claim 37 was amended as follows:

37. (amended)A freeze control system as in Claim 35 36, wherein said predetermined period of time is approximately one minute.

Claim 38 was amended as follows:

38. (amended) A freeze control system for a spa, wherein the spa is surrounded by ambient air defining having an ambient air temperature, said freeze control system comprising:

- A. a spa tub means for containing tub water defining having a tub water temperature,
- B. spa piping means for circulating water to and from said spa tub,
- C. a heating element means for producing heated water,
- D. at least one air blower means for blowing air into said spa tub,
- E. at least one water pump means for pumping the heated water,
- F. a first sensor means for detecting said tub water temperature,
- G. a second sensor means for detecting said ambient air temperature, and
- H. a computer means programmed to process signals generated by said first sensor means and said second sensor means, wherein said computer means automatically selectively activates and deactivates said heating element at least one air blower means and said at least one water pump means based upon inputs from said second sensor means so that the temperature of the water inside said spa tub means and said spa piping means is maintained above the freezing level.